WITH LARGE FREE SUPPLEMENT DESIGN SHEET

# Hobbies WEEKLY

CONTENTS



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## A Simple Modern
# MARBLE BOARD

MOST readers have had, at one time or the other, one of those glass-topped puzzles in which tiny steel balls have to be rolled into specified holes. Here, however, is a man-size modern version, guaranteed to give hours of fun and amusement, and offering scope for the maker's individual ideas.

Fig. 1 shows the completed model, whilst Fig. 2 shows, in a cutaway view, the "works". There are two "floors", A and B, the first forming a sort of false bottom and the second, the bottom proper of the tray. The upper floor has several holes in it. We have to try to get a marble or *large* steel ball-bearing into the end hole, which is ringed with, say, white paint.

### The Game

If the ball goes into any other hole, however, it falls through into the bottom part of the tray. It can be guided by means of the slanting strips, F, through a hole in the lower part of a partition, E, then up either of the ramps, G, through one of the upper holes in partition, E, and so into play.

Scattered about the board are other hazards: pins, etc., of which more later.

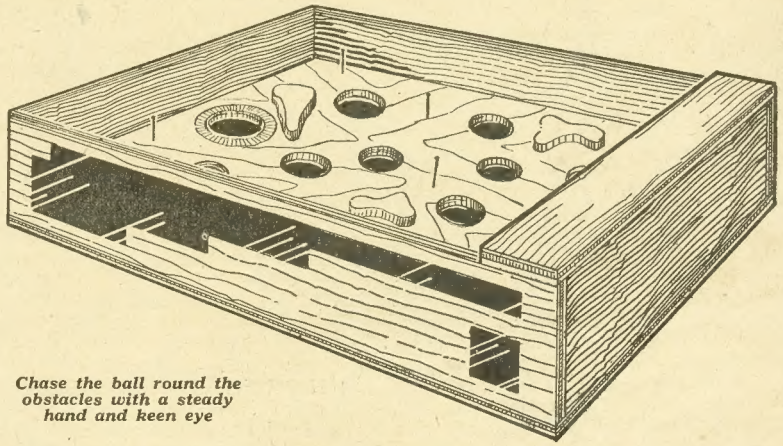
Plywood is ideal for making this model, but if unobtainable, such cardboard as leatherboard or composition board is quite suitable. A piece of plywood with a twist or warp can be used with good effect for the upper floor, A. A piece with a bad knot can also be used. The knot is filled with plastic wood, and when set, smoothed off. The filling will not be perfectly flat and if the ball passes that way it will be deflected, forming another hazard.

No definite dimensions will be given since the size of the model will depend on the wood available. A completed tray measuring about 14ins. by 10ins. would do very well, but it can be smaller. It should not, however, be unduly large and heavy, as it has to be held between the hands when manipulating the ball.

### The Floor Piece

The clear space between the two floors, A and B, will be about 1in. and the space between partition, E and end $C_1$, will also be about the same. Start by cutting floor, A. Drill some holes in it as shown. These need not necessarily be all the same diameter. The smallest of them will be just a little larger than the diameter of the ball used.

No holes should come over the



*Chase the ball round the obstacles with a steady hand and keen eye*

triangular pockets caused by the strips, F. Floor, B, will be about 2ins. longer than, A, and about ½in. wider. The two floors are separated at one end by strip, D, which can be about ½in. wide.

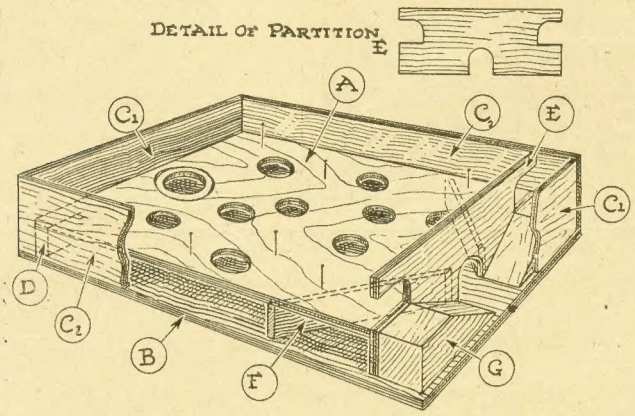
### Careful Cutting

Partition, E, is the only part which calls for much care in cutting. In the centre at the bottom, is an opening about 1in. square. (The top of the arch reaches to the underside of floor, A).

There are, as will be seen by reference to the diagram, two openings at the upper sides. These are also about 1in. square, and the lower edge of the opening comes level with the upper surface of floor, A. The size and shape of the ramps, G, can easily be found.

By the way, in a small model there is no need to have two ramps. Move the lower opening to one corner and the upper opening to the corner diagonally opposite. Make a ramp to carry the ball from one floor to the other.

The sides, $C_1$ and $C_2$, are easily added. They will be, roughly, 2½ins. high. As already mentioned, if a ball falls through a hole, it can be brought into play again by a tilt and a twist of the board.




*A helpful cut-away diagram showing parts and construction*

The drawings show hazards formed of nails and of small pieces of fretsaw waste, whilst we have already mentioned the fact that the floor, A, need not be flat and smooth, but twisted, with slight bumps and depressions. Students of local pin tables will get ideas for extra hazards, e.g., little spring buffers. A compromise should be struck between making the game too easy and too difficult.

For this reason, do not overdo the number of holes. Drive in the pins (or nails) lightly, and attach the "bunkers" lightly, too, so that a trial can be made. They can afterwards be made permanent if satisfactory.

### Suitable Colouring

As regards finish, the top floor, A, will probably look best in natural wood, varnished. The sides can be painted, and if desired, an ornament painted on. The ornament can also take the form of an overlay. Transfers or stencils are other possibilities. A glass top could be added, but there is always the danger that it will be broken.

The inside of the tray (between the two floors) is painted black. Strips F are, of course, fitted to one floor before the other is added. In the smaller models, solid triangular blocks of wood can be used.

There is no need to number the holes, as only one hole is the winning one. As hinted in the introductory paragraph to this article, however, other arrangements can be made.

For example, the board, painted green (and by means of plastic wood, etc., given an uneven surface) can have nine holes, numbered consecutively 1—9 to represent a 9-hole golf course. The idea is to get the ball through each of the holes in succession. Each time it goes down the wrong hole, one "stroke" is counted. Players can endeavour to reduce their handicap in which care and judgment will help.

## A Patchy Mirror

*I HAVE a mirror which has gone dull in patches. Can you explain the cause of these patches and how I may remedy them?* (*E.H.—Birmingham*).

THE blemishes on the mirror are probably due to either old age, dampness, or to mechanical friction, resulting in air reaching the film of silver which forms the actual mirror surface, and causing it to oxidise or turn dull and black.

There is no remedy for this except to have the mirror re-silvered, which would have to be done by a firm who make mirrors or specialise in mirror silvering.

## Non-porous Balsa

*IS there any preparation marketed for treating balsa wood to render it non-porous, or whether first painting with size and then enamelling would serve this purpose?* (*W.R.S.—Ipswich*).

ASSUMING that the filling is only required to enable a smooth finish on the surface, it would be best to use any good wood grain filler, or a paste made of whitening and gold size. Apply a coat, let it dry, then rub down with fine glasspaper. Repeat the treatment if necessary, then use an undercoat paint and when dry, apply the enamel finishing coat.

## Doll's House Lighting

*WITH reference to my modern doll's house, could you give me information regarding the most economic lighting system? Is a transformer necessary, and if so, explain type?* (*G.M.—Coatbridge*).

QUITE economical running should be possible if .06 amp. bulbs are used. Ordinary flash-lamp bulbs are not very economical. A small transformer could be used for operating the bulbs from the mains (if the latter are A.C.). This transformer should have a primary suitable for the mains (usually 230 volts, 50 cycles). The secondary should give about 2 to 6 volts at 1 to 4 amps., and bulbs of suitable voltage used.

## Crystal Set Loud Speaker

*PLEASE tell me if I could fix a loudspeaker on to a crystal set—if so how?* (*E.C.—Islington*).

A HIGH impedance speaker (by which is meant a moving-coil speaker with transformer, or moving-iron speaker) may be connected directly to the crystal set. But volume will be small and insufficient for most normal purposes. The only way to overcome this is to use an amplifier, which must be driven from mains or batteries. Such an amplifier was described in Hobbies Weekly, dated April 14th, 1948.

## Riveting China

*I AM in need of materials and instructions for riveting china.* (*S.H.—Dominica*).

THE only materials needed for riveting china are an archimedian drill, some small diamond pointed drills, and some soft copper wire about No. 20 and No. 18 gauge.

Holes are drilled through the china with the drills in the usual way, but preferably using turpentine as the lubricant.

The holes are located opposite each other and about ¼in. from the broken edges. The parts are then placed in position and can if desired, be cemented with "Durafix" or other good china cement. The copper wire is then laced through an opposite pair of holes, and drawn tight, and the surplus trimmed off and the ends turned down flat, thus forming a "stitch" or rivet to hold the two parts.

Full size patterns on page 59 for making these two

# SMALL WORKING MODELS

A FEW weeks ago (on Sept. 29th) we included in these pages some little working wooden models which could be worked off an electric motor. This week we add another two, to operate the same way, as shown in Fig. 1. In the machine on the left we see a power hammer operated by pulley and cam, while that on the right is a simple stamping machine worked direct from a wheel or pulley connected up to a crank rod and vertical spindle.

Both models are easy to construct, and make an interesting addition to a number of such-like models to be driven off a common pulley shafting. The latter is linked up with an electric motor or model steam engine. Wood ¼in. thick is used for all parts of the two models here shown, and the cutting can be done with the fretsaw direct from the patterns printed full-size on page 59 in this issue.

### The Hammer Model

In making up the hammer model, we have the base, A, which is given full-size on the pattern sheet. This outline, including the three mortises, can be either drawn direct on to the wood or the pattern stuck down to it. When cutting the mortises, keep the saw inside the lines to ensure a tight fit for the ¼in. thick uprights.

The two uprights, B, will next be made, and here again the full-size pattern provided may be stuck down to the wood. When it is cut, the edges should be cleaned and the piece then used as a template for marking round to form the second upright. See the two holes are exactly opposite and accurately cut. They should be a full ¼in. diameter so that clearance is allowed for the ¼in. round rod forming the cross spindles.

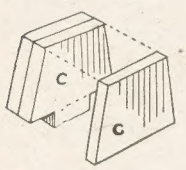


*Fig. 2—The block*

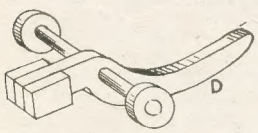


*Fig. 3—The hammer*

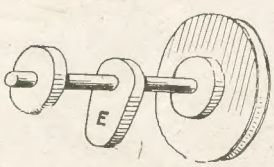


*Fig. 4—Pulley shafting*

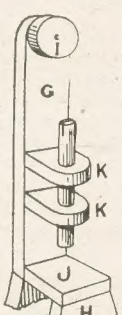


*Fig. 5—Pillar and crank*

The striking block for the hammer is made of three pieces as shown in Fig. 2. The middle member only has the tenon which will fit into the mortise in the base. The outline of the middle piece is given at C on the pattern sheet. The two side members can be outlined on the wood from this cut-out piece. Glue the three together and rub their three edges flush and even before gluing in place.

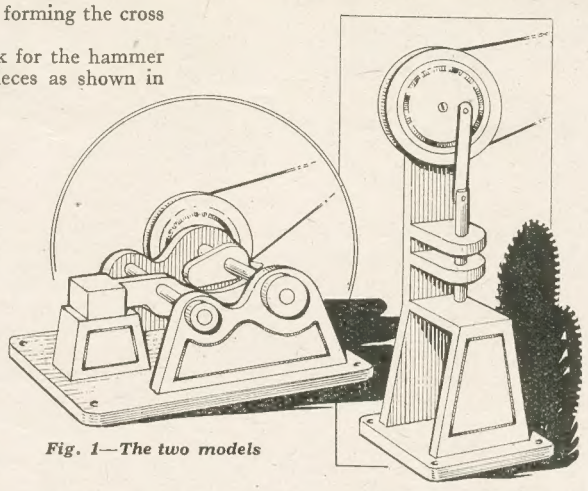


*Fig. 1—The two models*

The hammer is made from the piece, D, on the pattern sheet, with two small blocks of ¼in. wood glued on each side as Fig. 3. Cut off a length of ¼in. diameter rod 2¼ins. long and thread this through one upright. Then put on the lever, D, and continue to push the rod through the second side.

See the lever, D, is central on the rod before adding and gluing on the washers which might be ½in. or ⅝in. diameter. The rod for the pulley and cam is 2½ins. long and its two washers and cam and pulley wheel are shown assembled in Fig. 4.

### Pulleys and Washers

First make the pulley, 2ins. in diameter, with a groove made in its edge by means of a rat-tail file, or again a triangular file would form an efficient groove. Next cut two washers about ⅞in. in diameter with ¼in. holes in the centre. The cam is shown at E on the pattern sheet and the hole in this should make a tight fit on the rod. First glue one of the washers to the ready-prepared pulley wheels, and then glue one end of the rod into them.

Thread the rod through one of the uprights, B, and put on the cam. After again threading the rod through the further upright, B, glue on the second washer. Let the cam, E, be central between the uprights, B, so it forms contact with the lever, D, which rises and falls as the cam revolves. Make all edges smooth and clean surfaces of working parts before assembling them.

Our second model is somewhat simpler in construction and make-up than the first one. The illustration on the right, Fig. 1, clearly shows this. The square base is shown on the pattern sheet at F, and the outline and two mortises are again cut with the fretsaw. The two uprights, G and H, are now cut, noting that the two mortises, K, K, are on the scant side, so a firm fixing is made when the two parts, K, are glued in.

The top of the pedestal is formed by piece J, an oblong of wood as shown on the sheet. A plain disc, I, is next cut and glued at the top of upright, G, this forms a substantial base to which to screw on the pulley wheel.

The pulley wheel is 2ins. diameter and has a groove made in it in a similar manner to our previous model. It is attached to the upright by a countersunk screw, the head of this keeping flush with the surface of the wheel so that the crank bar may travel round uninterrupted. At a distance of ¼in. from the centre of the pulley wheel, bore another hole. This is to receive the small round-head screw which fastens the crank bar.

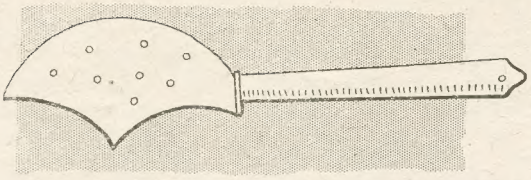
### Crank and Plunger

This crank bar is made from a piece of strip brass or tin about 2ins. long and ¼in. wide. Round off the ends of this and either drill or punch holes near the ends, file down and make smooth. The plunger is shown at L on the pattern sheet, and it consists of a piece of ¼in. diameter rod with a slot cut at one end. A hole is drilled through at right angles to it to receive one end of the crank rod. The plunger, L, should fit loosely into the two parts, K, so it can rise and fall with the movement of the crank and pulley wheel. A small brass pin or small nail is passed through the plunger and the metal crank.

The models at completion may be painted up in bright colours and panelled in line in places to give an added effect.

Followers of our metal-work articles can make

# A FISH SLICE



THIS useful slice — curved to fit into the edges of the frying pan, will be very handy when cooking eggs or fish and it can be made without much difficulty. The actual drawing out is rather more ambitious than required in your previous jobs, but with strict attention to the accompanying diagrams you should be able to develop the pattern quite easily.

The slice must be constructed in two separate sections, the flat—or actual slicing part—and the handle. It will be much easier if you completely finish each part separately before the final assembly.

### The Slice

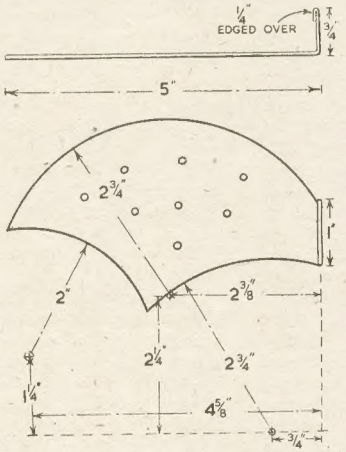
For this part you need fairly stiff material. It is no use if the weight of an egg or piece of fish causes it to bend, although you don't have to go around testing various pieces with an egg—just use your discretion!

Having chosen a suitable piece, the next job is to get the pattern transferred from the drawing to the actual metal.

Start with a central line and remember that the centre of the handle and the extreme tip of the slice must both lie directly on it.

Using a pair of compasses, (dividers, if you have a pair), mark off the shape with the aid of the various radii as shown in the diagram. Remember to mark out the pattern for the holes while you are on the job, using the same radial point as for the large back curve of the slice. It is better to punch your holes at this stage, before cutting out, as the extra body of metal will help to prevent the distortion caused by the punching operation.

Rest the material on a piece of lead or hard wood, and punch holes, filing off burrs afterwards and lightly tapping flat with the hammer. See the holes are of equal size and equally spaced out or the finished job will not have a workmanlike appearance.




*Elevation and plan of blade*

Having finished the hole pattern, cut out shape with shears and edge over the ¼in. piece in the bending blocks, flattening down on bench iron afterwards with a mallet. Having done this, the ¾in. part must be bent at right angles, again with the aid of the bending blocks. This will form the base or supporting piece for the handle.

### The Handle

The next job is to make the handle itself. For this portion you must use very thin material, for reasons which will be obvious later on. The handle is of tubular design and tapering from ¾in. down to ⅝in., where it joins the slice. Mark out the pattern as per figure, and cut out.

The actual bending, providing your material is thin enough, can be done with the fingers, and in order to form the tube it can be wrapped round a poker, or curtain rod. You will find, however, that when bent, it will not form a smooth tube owing to the presence of "bending lines" and to counteract these the material has to be "broken in".

You do this by straightening out after the initial bending, and wrapping round your poker in the reverse direction. Straighten again and bend as the first time. You will find that, the metal now having been "broken in", it will bend into a fairly smooth tube. There will be a slight lap along the joint and this must be well soldered right along its length.

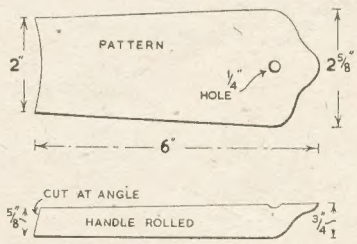
### Strengthening

If the material is springy and has a tendency to open out, you will have to grip it with a pair of pliers and tack at both ends with the soldering iron. In this case, when you start soldering, do the rest of the joint first before going over the tacked part, or it will simply spring open again. Smooth the joint with a file and emery paper.

At the large end you have a protruding portion and this must be punched so the slicer may be hung up when not actually in use.

The bottom, or narrow end, must be cut at an angle to ensure that the handle, when in position, will be slightly elevated. This is very necessary so the hand may be clear of the edge of the pan when using. File straight so that the end lies flush on the supporting piece and with the necessary elevation.

To assemble hold the slice in a vertical position and tack the handle in position. You can manage this job quite easily if you hold the slice between your knees and the handle in position with your left hand. Before the final soldering, view the slice from various angles to see you have got the two parts squarely together. Then solder the handle firmly to the supporting piece, leaving a good body of solder on for support. This can be filed neat and smooth afterwards.




*Pattern of handle and side view*

Finally, go over the whole job carefully to make quite sure that no rough edges have been overlooked, and your slice is ready for its try-out at breakfast time in the morning.

# Any housewife would welcome the gift of a FOLDING IRONING BOARD

JUDGING from the illustration, the little girl is wondering, somewhat doubtfully, how she is going to do all her "smoothing" on the ironing board that somebody made for mum. It is, of course, a standard size model, standing 30ins. high by 42ins. long by 8ins. wide, with a bottom leg splay of 12ins.

It could be made to a three-quarter size, thereby suiting most little girls; it is merely a matter of removing a quarter from all sizes. For instance, the height divided into four gives you the four quarters, each of which is 7½ins. Take off the 7½ins. which, from 30ins., leaves 22½ins., this being the height of the "three-quarter" model.

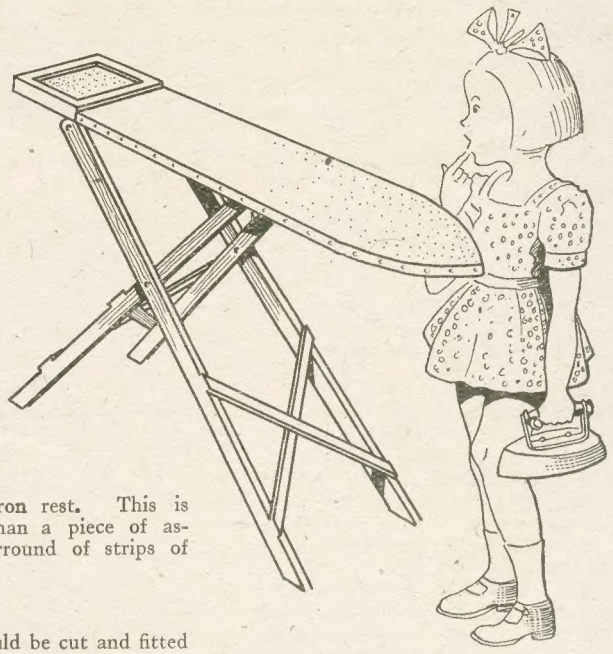
### General Sizes

The width of the ironing board is 8ins. Therefore, reduce it to 6ins. wide. The legs are 1½ins. wide. Take off ⅜in. The thickness of the legs is about 1in. Take off ¼in. Quite simple, really, without too much puzzling. Divide all dimensions into four, then remove one of the quarters.

The standard size board is light, yet strong and rigid, folding quite flat after use. Deal can be used throughout the construction. If you have difficulty in obtaining a bit of solid wood for the board, it can be made up as a frame, for covering with stout card, or thin wood, saved from an onion box, perhaps. In the ordinary way, a length of 8in. shelving board would be recommended, either ¾in. or ⅞in. thick.

The drawings at Fig. 1 show how the solid or framed board is made. In the first case, it is only a matter of cutting the board to shape. If the wood is exactly 8ins. wide, set your compasses to scribe an 8in. radius. The point, however, must be placed near the edges, about 7ins. from the end—not 8ins.

Having lightly smoothed the surface of the board and spokeshaved the shaped edges, fit the smoothing iron rest. This is nothing more than a piece of asbestos and a surround of strips of wood, ⅞in. by ½in.



### Iron Holder

The latter should be cut and fitted first. The ends should be mitred and the strips affixed with flathead screws, following which the asbestos sheeting is cut to be a force fit. Alternatively, get a piece of asbestos sheeting 8ins. by 6ins. and screw it to the board, then add the strips, putting them on top. If new, the asbestos will cut easily, but all holes will have to be drilled. Thick tinplate is an alternative.

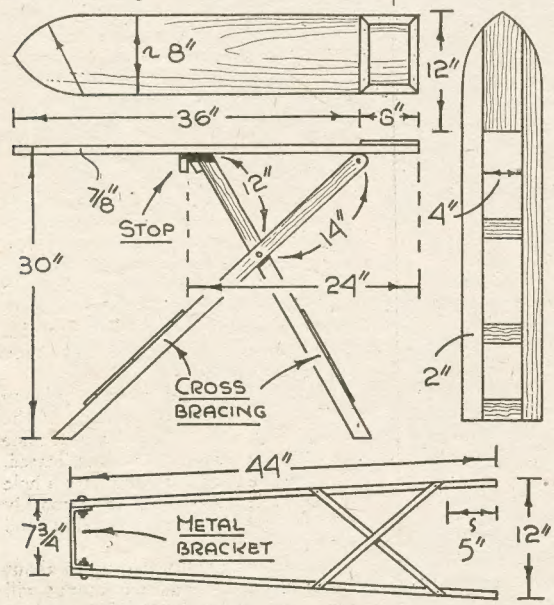



*Fig. 1—Top and side view, with details of board and leg framing*

### Frame Building

If you have to build up a frame, this can be done mainly with 2in. by ⅞in. material. The cross pieces, including the larger top piece, are dowelled between the side pieces. Make allowance in the length for cutting to shape, and when assembling the parts, see that the frame is not in twist. If all joining ends and edges are cut true and the dowel holes bored straight, the framing should cramp together without any tendency to twist.

### Main Leg Frame

A top plan of the main leg frame, with necessary sizes, is provided. The legs are 44ins. by 1½ins. by ⅞in. Round the top ends, and bore a ¼in. pivot hole 14ins. inwards (see side elevation).

You then require a metal bracket. This is made from mild steel bar 1in. by ⅛in. or anything similar. The ends are, of course, bent at right angles to form lugs for the pivots. It should be noted that the outside width of the legs, at the top end, is 7¾ins. As a result, the bracket must be made shorter to fit between with about an ⅛in. clearance on each side.

### Fitting Legs

If the wood used in making the legs is ⅞in. thick, make the legs 5¾ins. long. Bore ¼in. holes in the lugs and 3/16in. holes in the legs. The pivots are 3/16in. carriage bolts, about 1½ins. long. The bolts need to be a tight fit in the legs, with freedom in the lug holes.

When fitting the bracket between the legs, have a stout metal washer between the lugs and the sides of the legs. This is to allow for movement, when opening and closing. Extra holes are bored in the bracket for fixing to the board with screws. The position of the bracket is exactly 6ins. inwards from the rear end of the ironing board, as can be seen in the side view.

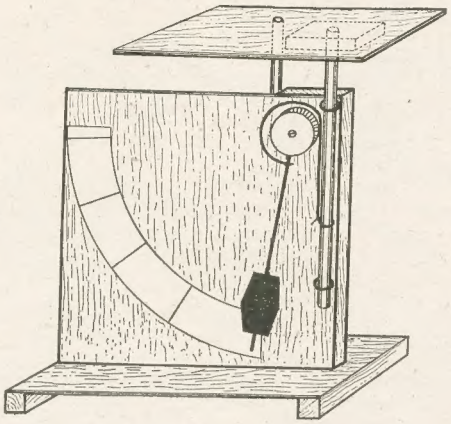
The inner frame has legs approximately 34ins. long. Bore the pivot holes 12ins. inwards from the top ends. Now, assuming you have fitted the bracing to the main legs so there is a 12in. wide splay, the shorter legs are set aside, and held in position

(*Continued foot of page* 56)

# Odd scraps of material can be made into useful POSTAL SCALES

MADE entirely from scrap this device for weighing letters and small packets for the post forms a most useful adjunct to any house or office. The one made by the author has been in use a considerable time and is functioning satisfactorily.

Based on the principle of the lever, it consists essentially of a "table" which, on being forced down by an article placed on it, causes a thread or wire to exert a pull on a small wheel. The slight rotation which ensues causes an indicator arm to move over a graduated scale, thus showing the amount of postage required.



### Size Immaterial

Sizes are of no real importance and will be controlled only by the materials available, and the bulk of the articles to be weighed. Where sizes are mentioned they are merely intended as a guidance and need not be strictly adhered to.

Start with the base, which is a piece of wood about 8ins. by 3ins., mounted on two ½in. strips. These strips serve to raise base sufficiently to clear heads of screws which hold the "pillar" in position. This pillar is about 1½ins. by ½in. and 6ins. long.

Mount on this a 6in. square of wood, the function of which is simply to support the graduated paper scale. Fix this square to the pillar before erecting; two screws through the base will be sufficient to hold it in place.

### Suitable Wheel

Next obtain the wheel, which, in the example shown, was a 1in. control knob from the radio junk-box. Select one with "square", not tapering rim, and drill through the Bakelite to permit passage of pivot-screw. Remove the grub-screw, and force into the hole a 6-inch length of stout wire to which is attached a lead fishing sinker. The sinker should weigh about one ounce.

If these sizes are adopted the end of indicator will move twelve times as far as the rim of wheel is turned by thread. Stiff brass wire is best and the sinker is readily fixed in position by gently tapping the lead with a hammer. Such sinkers are already pierced with a hole, which tightens round the wire when hammered.

### The Platform

Next the "table". For this a piece of wood is required cut to any desired size. On the underside is attached a 9 or 10-inch length of dowelling, about ¼in. diameter. This dowelling is fixed to the table by means of a small glued block as shewn by the dotted lines, though the dowel does not need to pass through table itself. Since there is no strain on this part of the apparatus ordinary tube glue is strong enough for securing both dowel to block and block to table.

With a screw that exactly fits hole in wheel, fix indicator to pillar as indicated in diagram. The wheel should move freely to and fro without "wobble". The sliding length of dowel is kept in position by means of two suitable screw-eyes, the position of which must be such that the moving leg of the table is as close as possible to the wheel without actually touching. As little as ⅛in. clearance is ample.

Slide the dowel into position, and fasten a piece of thread, double thickness sewing thread will serve, to the brass wire where it enters rim of wheel. Fasten the other end to the leg of the table. A spot of glue will prevent it from slipping.

It is well, in doing this, to place a weight at right angles to the dowel, and fasten thread while the table is at its lowest position. This will be the position of indicator when maximum weight is applied. In practice thread will, of course, lie closely in contact with rim of wheel—in diagram it has been shown away for the sake of clarity.

When released the indicator will come to rest approximately in the position shown. It will not hang straight down, for it is now supporting weight of table and dowel. Obviously, therefore, it is advisable to use the lightest material possible in the construction of these components.

### Calibration

Cut out a piece of stout paper as shown, in a true quadrant, having a diameter equal to the length from centre of wheel to limit of indicator. Temporarily fix in place with drawing pins ready for graduating.

This is achieved by placing a two-ounce weight on the table and marking point at which indicator comes to rest. Add another two-ounce weight and again mark where indicator points. Repeat until the whole scale is covered. These sections will, of course, decrease in size as the indicator rises up the scale, so do not attempt to calculate or guess them. They can only be found by actual experiment.

Two-ounce divisions are suggested as these conform to Inland Postage Rates, which are 2½d. for first two ounces and ½d. for each extra two ounces. The writer used two ounce bars of chocolate for calibration. They are ideal since if one-ounce, or smaller divisions are required, one merely breaks the chocolate into the requisite portions.

### For Small Postages

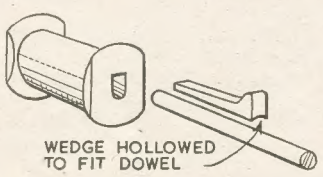
Remove the scale, ink in the divisions and mark with appropriate figures. If intended solely for postal purposes mark sections 2½d., 3d., 3½d. and so on. Finally fix the scale in position with paste, taking care to check its accuracy as you proceed. The scale is now finished and ready for use.

Should the table display a tendency to "swing", owing to twisting of the sliding leg, then it can be overcome by adding a second "leg" as indicated. This can be fixed with glue into a hole in the table and should ride smoothly in the angle formed by pillar and graduation board.

Such a scale will weigh up to about 8ozs., though the actual amount will be controlled by the weights employed, length of indicator arm, etc.

## FOR SHAPING DOWELLING

***A helpful holder for wood when shaping round to a dowel rod, is shown here. The cotton reel has two edges removed so it can be held securely in a vice. The dowel for shaping is fitted into the hole, a wedge holding it in place as shown in the drawing—R. W. — Rhondda, S. Wales.***



# An ordinary battery can replace accumulators to provide AN ALL-DRY RECEIVER

IT is possible to replace the 2 volt accumulator used with ordinary battery receivers by dry cells. This saves expense, and also reduces size and weight in portables. It is a very useful method to employ with small receivers because a dry battery costs a few pence, whereas accumulators cost several shillings.

It can be employed with large receivers, but here it becomes more economical in the long run to use an accumulator because the current consumption is heavier.

### 1.4 Volt Valves

Manufacturers are now producing valves with 1.4 volt filaments. These have been very popular in all-dry portables, as they are worked from a single 1.5 volt dry cell.

They use very little current and can replace the 2 volt valves which require an accumulator. Any home-made receiver can use one or more of these valves, provided the valve-holders are changed accordingly. (Holders of different shape are used). It is then only necessary to discard the accumulator, instead using a single dry cell.

### With 2 Volt Valves

If the ordinary 2 volt valves are retained, either an accumulator or a dry battery can be used as convenient. But as a two-cell dry battery gives 3 volts, the unnecessary 1 volt must be dropped. A resistor connected in one lead, as shown in Fig. 1, accomplishes this.

The voltage drop in any resistor depends on the current flowing. It is, therefore, necessary to add up the current taken by all the valves. The consumption is usually marked on the valve. If not, it can be found from valve lists. Ordinary detector and low frequency valves take .1 amp.; output valves and output pentodes usually take .2 amp. High frequency valves usually take .1 amp. A 1-valver would, therefore, take .1 amp. A detector-l.f. 2-valver takes .2 amp., and a detector-pentode .3 amp., and so on.

### Voltage Drop

With .1 amp. flowing, a 10 ohm resistor will drop 1 volt. With .2 amp. flowing, the resistor should be only 5 ohms. If the receiver uses .3 amp., then the value should be approximately 3.3 ohms. The exact value is not particularly critical. The resistor must be a wire-wound type suitable for the current.

Resistance wire can be bought which is so many "ohms per yard". If that obtained was 10 ohms per yard, then one yard should be used for the 1-valver; 1ft. 6in. for the 2-valver, and so on. The wire is wound on a strip of wood or similar material.

If thin iron wire of unknown resistance is to be used, there are two methods of determining the amount to use. For the first, connect a 2 volt accumulator as usual.

Now set tuning and reaction controls so that the set is *just* oscillating.

Then connect the 3 volt dry battery with an ample length of resistance wire in series in place of the accumulator. Now reduce the length of resistance wire bit by bit until the set just begins to oscillate. 2 volts will then be reaching the valves, and the correct length of wire can be cut off and wound as mentioned.

For the second method, connect a good, accurate voltmeter across the valve filaments and adjust the length of resistance wire until the required reading of 2 volts is obtained.

The ordinary 1.5 volt dry cell drops to 1.4 volts on discharge. A so-called 4.5 volt dry battery is thus only 4.2 volts under these conditions. As a 2 volt accumulator is slightly over 2 volts when fully charged, it is, therefore, quite in order to connect two 2 volt valves in series and operate them from a 4.5 volt dry battery. Fig. 2 shows the connections.

No resistor is used, but one or two points must be noted. One is that the detector grid leak should be left

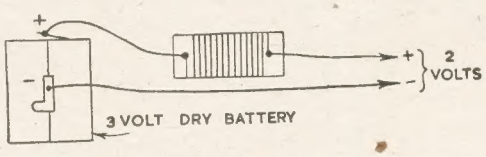



*Fig. 1—How the dropping resistor is used*

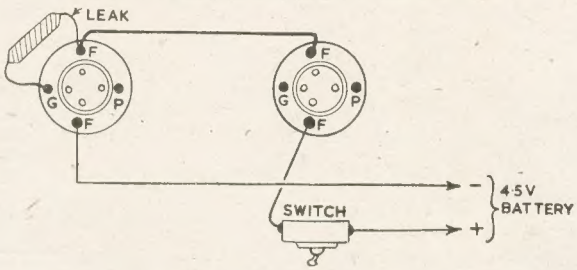



*Fig. 2—Filaments in series*

connected so that only 2 volts are applied through it to the grid. That is, it should not go to the 4.5 volt connection, which would make results poor.

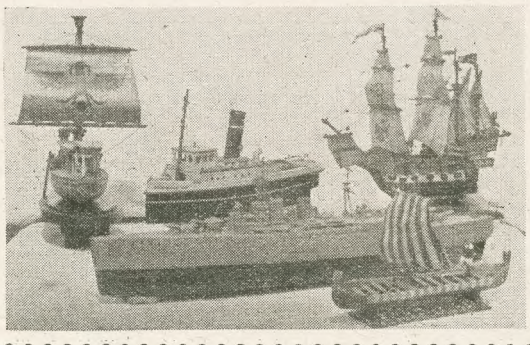
Usually it will only be necessary to change a filament lead or two, leaving all other wiring unchanged. After the change the grid bias may need altering by 1.5 volts because the second valve filament is not directly earthed.

The second point to note with this method is that the filament consumption of both valves should be the same, so that the total voltage coming from the dry battery will be equally divided. Because of this it is most suitable for small detector-l.f. sets.

### Current Consumption

The 1.4 volt valves use about 1/6th the current taken by a small torch bulb, and the 2 volt valves about ⅓ to 1/3rd. So with a fairly large dry battery quite a long period of operation is possible.

But it must not be expected a dry battery will last as long as an accumulator at many times the price. It will not. Because of this the dry batteries are particularly suitable for the smaller sets.



## A READER'S COLLECTION

*A range of ship models from Hobbies designs made by 50 year old reader H. Edmonds of Billericay, Essex. The pre-war Egyptian Galley and Viking ship now out of print. The Tug and Battleship shown are driven by small electric motors. A collection of interest and craftsmanship.*

## The concluding article on how to make your own

# STENCIL XMAS CARDS

WE are concluding our articles on novel Christmas card manufacture by showing another very attractive suggestion at Fig. 4. It is based on a fretwork design. Notice the wordless margin, which simplifies the preparation of the stencil plate considerably, yet adds a new colour to the front of the card, assuming the greetings matter inside


*Fig. 4—Another attractive design*

is done a different colour. You will find that red and green are very universal and most pleasing colours to use.

The stencil design shown at Fig. 5 are smaller in length to suit the inside front section of the folded card paper. A simple greetings arrangement is shown, with an original verse, if wanted.

Either of the "additions" can be worked into the style of card shown at Fig. 4. In regard to that illustrated at Fig. 1, however, the verse is wanted — not a second greeting section. These little things must be considered. Avoid giving extra work by "repeating" yourself, or virtually doing so.

Extremely small lettering, perhaps only ⅛in. high, should not be attempted. Apart from the difficulty of cutting out the tiny spaces and leaving tinier tie pieces, the bristles of the stencil brush cannot readily work themselves into the spaces and thus ensure sharp neat impressions.

Two styles of lettering are used in the various examples illustrated, particularly at Fig. 4. The easiest form is shown by the words "KIND THOUGHTS". A modern form of "shadow" lettering appears on the


*Fig. 5—A simple greeting and verse*

pattern page and again at Fig. 7. This, while arresting to the eye, is intricate and difficult to cut out accurately, unless on a fairly large scale.

When designing your own cards, aim at simplicity. The less put on a card, the more impressive and specialized it seems. Cramped lettering is bad, including too much fancy work or decoration.

All the examples shown are actual "prints" from stencils made by the writer, and experience shows that care and patience is wanted. Why begrudge extra time on making neat stencil designs? Any faults in the completed stencil will always repeat themselves. One can, however, often correct mistakes by cutting away the faulty portion and inserting a fresh piece of film, the latter being held with strips of gummed paper tape at the reverse side of the stencil. Repairs in this fashion mean extra labour, so the need for care cannot be over emphasized.

While it is possible to make suitable envelopes, it is not worth while attempting to do so, unless they are difficult to obtain. The bought envelopes save a lot of bother.

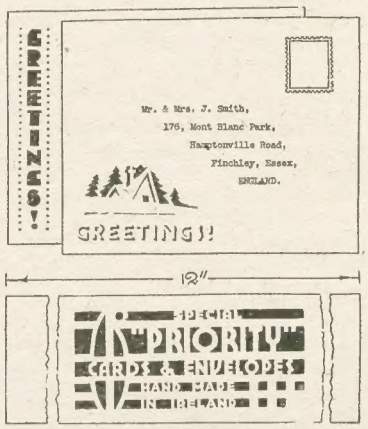



*Fig. 6—Envelope and wrapper*

You should make a point of making your envelopes up-to-date and distinctive by printing "GREETINGS!" on the face side, as shown at Fig. 6. A tiny snowy picture helps to introduce novelty and the right atmosphere. A fictitious address has been typed on one of the example envelopes to show the effect better; the postage stamp position could be a coloured oblong measuring ⅞in. by 1in.

A very professional appearance is given to the cards and envelopes when done up with a special printed wrapper, as depicted at Fig. 6. There is no need to adopt the particular design of wrapper shown or use the name of "PRIORITY" which might clash with "rival" card manufacturers like yourself.

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**Ironing Board**—(*Continued from page 53*)

temporarily with bolts and nuts, with washers between.

The washers ensure some amount of necessary clearance. A top cross piece is fitted to the top ends of the inner legs. This cross piece should be screwed on, being 2ins. wide by ⅞in. thick. It should be cut about 3/16in. shorter than its required length so it is free to move between the main leg framing.

Add the bracing. This bracing is either strips of wood or metal ⅞in. by 3/16in. Fit with nails or fine screws. So as to keep the inner leg frame in place, a bar of wood is screwed to the underside of the board 24ins. inwards from the rear end; this acts as a stop.

When the metal bracket is screwed to the board and the inner frame brought up to the stop (have the work turned upside down on the bench or table, by the way), it will be seen that the top ends of the inner frame legs need to be cut to an angle, with the cross piece planed to a similar angle.

This can be all done beforehand by assembling the parts together temporarily. The bottom ends of the legs are marked off on a level, using a straight piece of wood, and the angle cut.

To complete the work, cover the board with old blanket or flannel, then put on linen, finishing off the edges with leatherette strapping and studs. The woodwork could be given a coat of varnish stain or left in the white, natural state. Be sure to see that the work stands perfectly rigid on its legs. There must be no "rocking" from side to side.

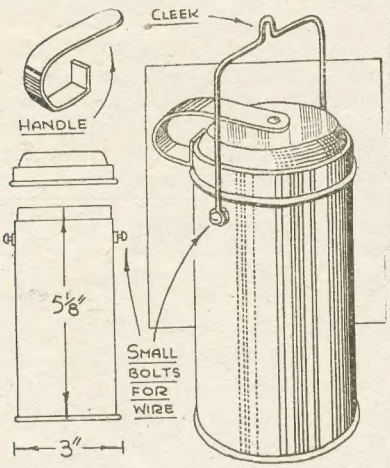
The handyman will find it worth while to make these

# TWO THINGS FROM TINS

MOST manual workers, who cannot get home for lunch because of distance, usually take sandwiches with them to work, including tea, sugar and milk. At a gas-jet in the workshop, they prepare tea in a special billy-can, this having a lid which can be used as a cup for drinking the hot tea.

## A TEA CAN

These special tea cans do not last for ever, of course, and any reader wanting a new can, with drinking cup, will be interested in the idea shown in the diagram herewith. Here you see a home-made type, made from a cocoa tin, some wire and a few other odds and ends. Its capacity is two large




teacupfuls, costs nothing to make and should serve its purpose for a long time.

### The Tin Used

A tin specially ideal for conversion is a ½lb. circular cocoa container, made with the type of lid shown. Of course, anything similar can be used. Ordinary lids, however, do not make suitable drinking cups. If difficulty is experienced in the matter of a suitable lid, it is always possible to use tin cups, or a china cup—probably an old, odd cup which can be kept, together with the tea-and-sugar box, at work. Many men prefer this arrangement, as the lid cup, filled with hot tea, is often too warm for the lips.

Assuming you have managed to obtain an empty cocoa tin of the type recommended, it is only a matter of fitting a tin handle to the lid, then a wire handle to the container.

For the lid, a strip of tin, folded at the edges, can be used. It is bent to the shape shown, then soldered to the lid. It could be affixed with rivets, but soldering makes a better fixture, and the lid will not be liable to leak.

Regarding the wire handle, the best way to attach this is to provide bolt lugs. Two ⅜in. long by ⅛in. bolts are affixed with nuts, one at each side, in alignment, just below the lid neck. Space is left for the thickness of the wire. Any stout wire, about 15 s.w.g., which is often found around boxes, can be used.

The wire is first bent to form the cleek. The ends are then partly looped for anchoring to the lugs. You could, with the use of round-nosed pliers, form "eyes" at the ends of the wire. To fit the handle, the eyes are partly opened, then closed when on the lugs, using pliers.

Note that a nut is at the outside of the tin. A second nut screws on at the inside and both nuts are tightened against each other to lock them. A spot of solder could be applied to the nuts to secure them and prevent leakage. The outside nuts, of course, give clearance to the movement of the handle. If not provided, the handle will foul the "bead" on the lid. There is no need to finish the tea can in any way.

## FLOUR BIN

EXCELLENT containers for flour, sugar, etc., can be made from large empty sweet tins. A tin measuring 9ins. long by 7ins. in diameter holds about ½ stone of flour. Most of these tins are well made and ideal for the purpose. All you have to do is to obtain such a tin—try to buy one, in fact, from a store or sweet shop. Most shopkeepers have a number of these empty tins, and you should be able to get one for a few pence. You are not, incidentally, confined to one particular size.

The idea about to be outlined can be applied to all sorts of tins. You can have containers for tea, hard peas, cloves, pepper and similar dry items. Salt, of course, cannot be kept in bare tins, even though it may be the dry powdery salt. After a time, the salt becomes damp, and dampness, of course, creates rust in the tin, and the rust contaminates the salt. Glass or wood makes the best container for salt.

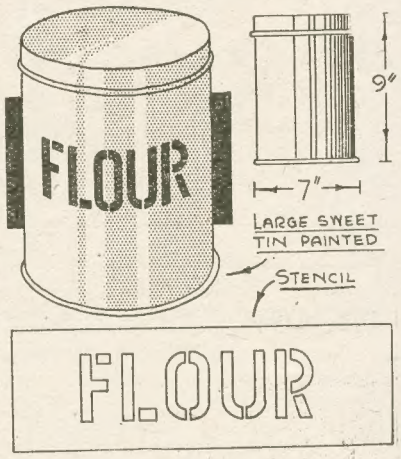
### The First Operation

The first operation in converting the empty sweet tin into a useful household necessity is to wash it, and its lid, in hot water, then rinse out and dry it. A coat of bright coloured enamel paint is then brushed on the outside of the tin, including the lid. Do the sides and bottom, all on the outside. Do not paint the top rim of the tin where the lid fits. Keep the "bead" free from paint, too.

The outside of the lid is done all over. When the enamel dries, and the lid is fitted on top, a form of "silver" bead separates the lid from the tin and makes the whole thing quite professional in appearance.

Once the enamel has thoroughly dried, the container must be classified in some way to indicate its particular use. If intended for holding flour, then the word should be printed on it in large letters, as shown.

Now, printing letters on a semi-




circular surface can be very tedious, so to simplify matters, you should prepare a paper or thin card template, with the letters cut in it stencil fashion, as shown. The strip of paper or card is then held firmly around the tin and, using an almost "dry" paint brush, dab the letters with its tip.

You must, of course, use a contrasting colour of paint for the lettering. If the tin is coloured bright green, then the letters may be black, white or crimson. If painted crimson, the letters can be white, yellow, orange, etc. Yet another plan is to print the letters on gummed paper, thus making a label which can be adhered to the tin.

The painted lettering, however, is the best, and more lasting. Stencils are easily made on thin stiff paper, the spaces being cut out carefully with a sharp-tipped penknife. Stencilling is easy if you possess a small paint spray, but the stencil paper will have to be much larger than shown in order to give a complete "mask" to the paintwork on the tin.

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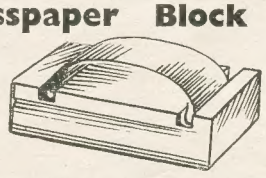

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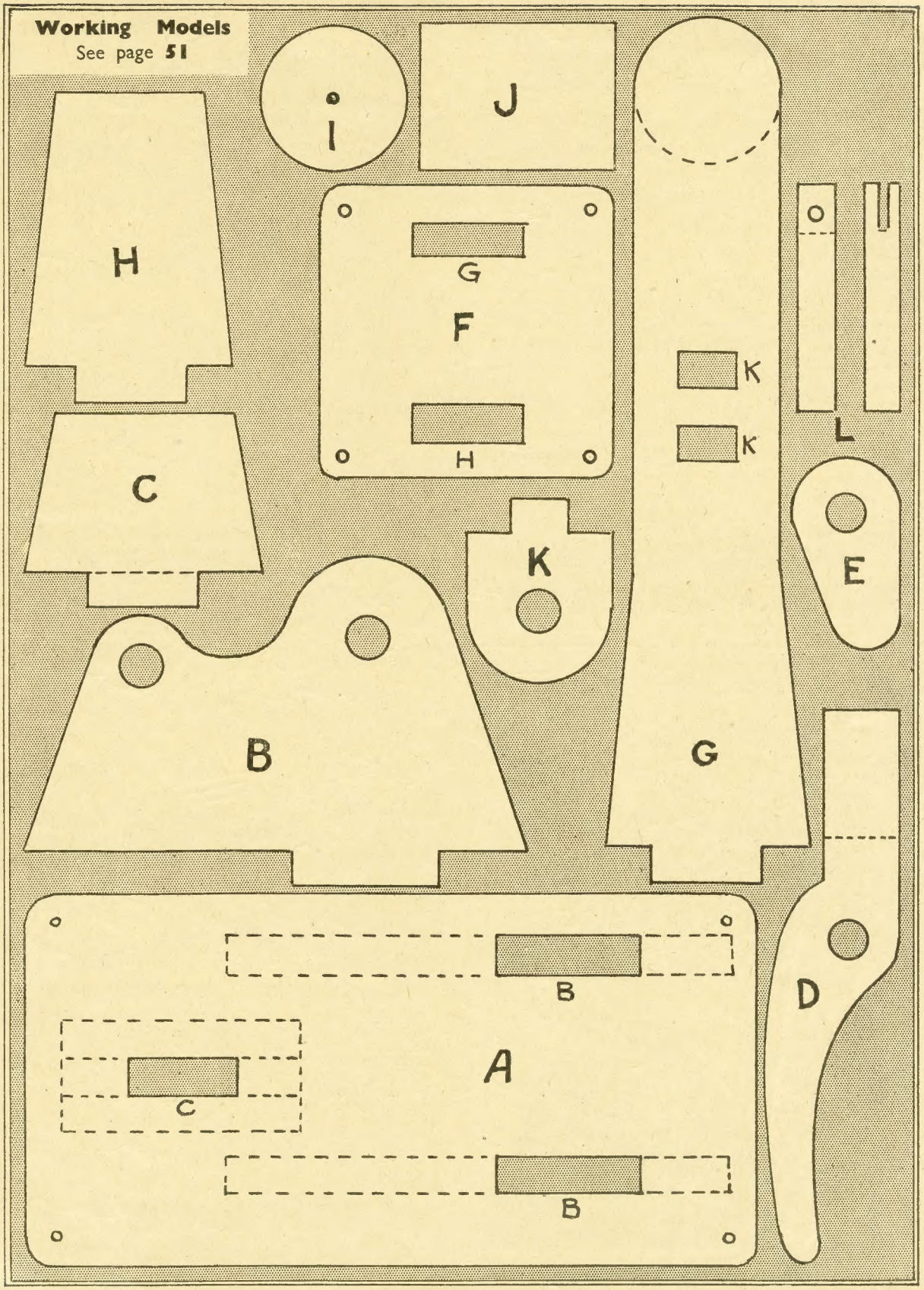
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